is much less steep than the present land surface so the deposits generally thicken in a direction away from the present valleys.

Listed below are a few of the most accessible localities in Utah where different kinds of deposits may be examined. These localities are cited merely so that persons interested in prospecting for this type of clay can acquaint themselves with some of the varieties that are available because of differences in the parent rocks; the particular deposits are not necessarily of commercial extent.

Clay containing considerable aggregate, in part pebbly, can be found in the eastern part of the Traverse Range immediately northwest of Alpine. This clay developed from gravel deposits containing pebbles of limestone, quartzite, granite, and latitic lavas. Similar high-aggregate-bearing clay that formed directly on bedrock formations of limestone, quartzite, and latitic lavas occurs in the western part of the Traverse Range.

Clay that contains very little aggregate, and that formed on a shale formation, is well exposed along the Pole Canyon Road on the south side of Provo Canyon.

Clay formed on a limestone formation is exposed in road cuts along U. S. Highway 91 between Brigham City and Wellsville. Clay formed on rhyolitic flows occurs in the Tintic district at the southwest base of Packard Peak about $1\frac{1}{2}$ miles northwest of Eureka.

Many other localities are known; those listed are merely readily accessible examples of some of the varieties of the clay and they are not to be regarded as the most promising localities. Indeed, all the mountains in central and western Utah, the Uinta Mountains, and the high plateaus of central and south-central Utah are favorable areas for prospecting for these clay deposits. Similar areas in the adjoining parts of Colorado, Wyoming, Idaho, and Nevada appear to be equally promising.

TABLE 2.—CERAMIC TESTS OF SAMPLES OF CLAY FROM SOME ANCIENT SOILS IN UTAH

Clay sample No.	Sieve analysis				Tempering water	Shrinkage during drying	Total shrinkage after heating 1000°C/hr.	Color after heating 1000°C./hr.	Total shrinkage after heating 1100°C./hr.	Color after heating 1100°C./hr.
	On 100-mesh sieve	On 200-mesh sieve	On 325-mesh sieve	Through 325-mesh sieve						
	percent	*percent*	*percent*	*percent*	*percent*	*percent*	*percent*		*percent*	
1	19.2	8.2	6.5	66.1	29.2	8.4	13.3	Brown-red	7.5	Dark red brown
2	11.15	10.3	9.15	69.4	26.1	9.2	12.5	Brown-red	7.1	Dark red brown
3	3.9	1.0	2.2	92.9	29.4	—	10.2	Salmon	12.4	Dark red

PALEONTOLOGY.—*Genotypes of some Paleozoic Bryozoa.*[1] HELEN DUNCAN, U. S. Geological Survey. (Communicated by JAMES STEELE WILLIAMS.)

In the course of investigations of the literature on some Paleozoic Bryozoa, several species commonly considered to be genotypes were found to be inacceptable under the International Code of Zoological Nomenclature. Inasmuch as some of these erroneous designations can not be corrected incidentally in studies now in progress, the required changes and their taxonomic significance are discussed here. The seven genera involved are: *Batostomella*, *Dichotrypa*, *Meekopora*, *Nematopora*, *Taeniodictya*, *Trematella*, and *Worthenopora*.

With the exception of *Trematella* Hall, the genera affected were proposed by E. O. Ulrich between 1882 and 1890. Some of the confusion is traceable to delay in the publication of his monographic study of the Paleozoic Bryozoa that appeared in volume 8 of the Geological Survey of Illinois. The literature indicates that other paleontologists knew of Ulrich's manuscript genera and species. In fact, Ulrich (1890a: 679–680) voluntarily transmitted diagnoses of his unpublished genera, their intended geno-

[1] Published by permission of the Director, U. S. Geological Survey. Received February 17, 1949.

types, and lists of species included in each genus to S. A. Miller, who published all this information in his *North American geology and palaeontology*, which appeared in 1889, a year before the Geological Survey of Illinois volume. Most of the species Ulrich intended to make types of his new genera were *nomina nuda* in 1889 when Miller published the generic diagnoses. Fortunately, many of the lists in Miller consisted exclusively of undescribed species. Genotype designations for most of Ulrich's genera were therefore validated in 1890. However, the species lists for three genera—*Dichotrypa*, *Meekopora*, and *Worthenopora*—each contained a single previously described species. As the intended genotypes were *nomina nuda* and therefore unavailable in 1889, these three genera are monotypical, the one valid species listed for each in Miller's work being the type.

Conditions of original publication necessitate recognition of species other than those ordinarily cited as genotypes for *Batostomella*, *Nematopora*, and *Taeniodictya*. The fact that Ulrich first published these names prior to 1890 in connection with species he discussed or described restricts the selection of types to those species originally included in the genera.

According to Opinion 7 (On the interpretation of the expression "n.g., n.sp." under Article 30A), the genotype of *Trematella* Hall was fixed by a technicality of expression employed in the original publication. Consequently the species hitherto regarded as type of the genus is inadmissible.

Although these erroneous designations have been ignored or overlooked for more than half a century, their perpetuation, whether intentional or inadvertent, certainly should not be continued. Except in the case of *Batostomella*, application of Article 30 of the Code for the recognition of genotypes does not seem to make any material difference in the systematic interpretation of the genera. It would be unnecessary therefore, if not impossible, to recommend suspension of the Rules in the interests of stability of nomenclature.

The revised concept of *Batostomella*, based on the genotype selected by Miller, has rather extensive taxonomic implications. As now interpreted, the genus must be referred to another family of trepostomatous bryozoans and is therefore inacceptable zoologically as the type of a family characterized by structural features hitherto called "batostomellid." Owing to original misconceptions, a heterogeneous assemblage of genera had been assigned to the Batostomellidae, and the family stood in much need of revision even before present investigations demonstrated the name to be nomenclaturally inapplicable. On morphologic grounds, the taxonomic problem can be solved most practically by referring the early Paleozoic "batostomellid" genera to other families and by erecting a new family for the later Paleozoic "batostomellids." The family Stenoporidae is therefore defined to include the stenoporoid and leioclemoid types that formerly comprised the main elements of the Batostomellidae. The probable relationships of "batostomellid" genera that do not fall within the limits set for the new family are discussed so far as existing knowledge of them can be evaluated, and if possible these genera are assigned elsewhere in the classification.

In addition to the demonstrably erroneous designations here discussed, inconsistencies discovered in standard generic synonymies aroused doubt regarding the status of the genotypes commonly cited for *Lyropora*, *Ptylopora*, and *Streblotrypa*. As far as it has been possible to check, their type species appear to have been selected in accordance with Article 30 of the Code. However, the synonymies for these three genera should be revised to include at least the significant citations that bear on the recognition of their type species.

The 10 genera for which genotypes are clarified or corrected as a result of this investigation are taken up in alphabetical order on the following pages.

Special acknowledgment is made for advice on nomenclatural problems generously given by Dr. J. Brookes Knight, of the U. S. National Museum. Access to type specimens from the American Museum of Natural History was arranged through the kindness of Dr. A. R. Loeblich, Jr., of the U. S. National Museum.

STATUS OF BATOSTOMELLA ULRICH, 1882

No type species was designated for the genus *Batostomella* at the time of original publication (Ulrich, 1882: 140–141). Four species and one variety, all previously described, were included in the genus, however; and two of these, *Chaetetes gracilis* Nicholson ex James (Nicholson, 1874a: 504) and *Calamopora tumida* Phillips (1836: 200), were described superficially. On a subsequent page of the same article (Ulrich, 1882: 154), a diagnosis of *Batostomella* was published but no type was named. Three undescribed (and unnamed) species were mentioned also by Ulrich (1882: 141) as belonging in the genus, but these presumably were not published until several years later (Ulrich, 1890a: 432–436) when he described six new species. Ulrich's generic diagnosis of 1890 (1890a: 375) is accompanied by the statement that the types of *Batostomella* are "*B. spinulosa* n. sp., and *B. gracilis* Nicholson." Between 1882 and 1890 and especially after 1890, Ulrich's concept of the genus changed, for several of the species originally included and two of those described in 1890 were placed in other genera.

When Miller (1889: 294) published a diagnosis of *Batostomella* with a list of seven species, six of which were *nomina nuda*, he designated *Chaetetes gracilis* Nicholson as genotype. Inasmuch as Ulrich's original concept of *Batostomella* as well as his 1890 interpretation of the genus was definitely based in part on *Chaetetes gracilis*, Miller's designation of this species as genotype not only fulfills the requirements of Article 30 of the Code that the type must be selected from the originally included species, but also seems to be the only practical selection that could have been made.

Subsequently Ulrich (1893: 228) assigned *Batostomella gracilis* to *Homotrypella* Ulrich (1886a: 83) and commented that the genus *Batostomella* must "be restricted to the Devonian and Carboniferous species originally intended as types." Nickles and Bassler (1900: 185) appear to be responsible for assigning the species to *Bythopora* Miller and Dyer (1878: 6), a genus antedating *Batostomella* by four years. If this generic assignment is accepted, *Batostomella* is to be considered a junior synonym of *Bythopora*. A study of the type species of these two genera, however, has raised much doubt that *Chaetetes gracilis* Nicholson is congeneric with *Bythopora fruticosa* Miller and Dyer (1878: 6–7), a junior objective synonym of *Helopora dendrina* James (1878: 3), the genotype of *Bythopora*. The present location of Nicholson's type or types is unknown, but specimens of *Bythopora gracilis* from the Maysville of Cincinnati, Ohio, in the collections of the U. S. National Museum, which agree with Nicholson's descriptions in all respects, exhibit wall structure and other characters that are typical of heterotrypid genera. This observation is strongly supported by Nicholson's descriptions and figures of what was presumably the original type material (Nicholson, 1881: 125–128). On the other hand, the wall structure of *Bythopora dendrina* (James) and several other closely related species is practically indeterminate owing to the minute size of the zoaria, obliquity of the zooecia, narrowness of the mature zone, and the consequent difficulty of preparing tangential sections adequate for study. The group of species typified by *B. dendrina* is believed to be generically distinct from the more robust species exhibiting heterotrypid wall structure, such as *Chaetetes gracilis* Nicholson and *Chaetetes meeki* James (1878: 1), whose characters are not readily comparable with those of typical species of *Bythopora*. It is therefore here considered that *Batostomella* is a valid genus of lower Paleozoic Heterotrypidae.

During the summer of 1948, after the writer's investigations of these nomenclatural problems and their taxonomic ramifications had been largely completed, copies of a paper containing a discussion of the status of *Batostomella* arrived in this country. Crockford (1947: 33–34) has reviewed the nomenclatural problem and pointed out that *Batostomella spinulosa* Ulrich is inadmissible as a genotype. Miller's designation of *Chaetetes gracilis* as type of the genus apparently did not come to her attention. Inasmuch as she did not have access to the specimens and some of the literature bearing on the *Batostomella* problem, Crockford did not attempt to correct the existing confusion, though she discussed the rejected synonyms of *Batostomella* and their inadequacy as replacing names and mentioned the need for renaming the family.

NOMENCLATURE AND TAXONOMY OF THE LATE PALEOZOIC "BATOSTOMELLID" BRYOZOA

For taxonomic purposes it is not particularly unfortunate that the name *Batostomella* must be either submerged as a junior synonym or, which is more likely, employed for a genus of early Paleozoic heterotrypid bryozoans. Paleontolo-

gists working on the Bryozoa (Ulrich, 1890a: 365; Condra, 1902: 342; 1903: 47–48, 98–99; Girty, 1907: 43; 1913: 316; 1915: 323–326; Moore, 1929: 13; Nikiforova, 1933a: 24–25) have commented on the difficulty in setting the limits of the genus and in determining the relationships of species assigned to it with those identified as belonging to other genera, some of which are not even classified in the same family or order. Some of the late Paleozoic species hitherto assigned to *Batostomella* Ulrich may be referred to other genera such as *Megacanthopora* Moore (1929: 10–13), *Dyseritella* Girty (1910: 193), *Stenopora* Lonsdale (1844: 161–162), *Stenodiscus* Crockford (1945: 21), *Rhombopora* Meek (1872: 141), and possibly other rhomboporoids.

Two genera, *Geinitzella* Waagen and Wentzel (1886: 875, 880–882) and *Batostomellina* Vinassa de Regny (1921: 227), generally have been held to be the same as *Batostomella*. The possibility of using these names for late Paleozoic "*Batostomella*" therefore must be considered. As type specimens of the genotypes are not known to have been sectioned in connection with earlier studies, our knowledge of these genotypes is based on material identified by other workers as belonging to the species.

Status of Geinitzella.—The genus *Geinitzella* has been a source of much nomenclatural and taxonomic confusion. Most paleontologists have assumed that its genotype was *Coralliolites columnaris* Schlotheim, 1813, a species referred to *Stenopora* Lonsdale, 1844, by King (1850: 28–29). It is highly probable that many of the specimens identified with Schlotheim's species do not belong in it. In fact, Schlotheim himself must have assigned more than one species to his *Coralliolites columnaris*. Schauroth (1854: 542–543) commented on this, but subsequent authors (Geinitz, 1861: 113–114; Dybowski, 1876: 6–7; 1877: 68–69) regarded Schauroth's conclusion as erroneous. In the original publication, however, Schlotheim mentioned the species as probably occurring in the Grauwackenschiefer (Schlotheim, 1813: 29) with other fossils that are presumably of Devonian age. On a subsequent page (Schlotheim, 1813: 59–60), *Coralliolites columnaris* was discussed as a fossil of the Zechstein, and this is the citation which King, Geinitz, Dybowski, and later authors all give as the original description (if it can so be construed) of the species. Schlotheim (1813: 74) also included *Coralliolites columnaris* in the faunal list for the Jurakalkstein. As is to be expected in paleontological work of this early period, Schlotheim distinguished his species on gross characters and lumped specimens from rocks of widely different ages into the same species. It is impossible to tell from the original publication just what was included in *Coralliolites columnaris*. The passage cited (Schlotheim, 1813: 59) as the original description merely states that the species is a characteristic type of coral superficially resembling and very easily confounded with the stems and columnals of crinoids. Schlotheim further commented that these forms correspond for the most part with the coral type illustrated by Picot de Lapeirouse T. X. F. 6. The figure cited (Lapeyrouse, 1781: pl. 10, fig. 6) is that of a Cretaceous rudistid. A study of Schlotheim's original "types" would be needed in order to determine the exact systematic position of the fossils he included in *Coralliolites columnaris*. No mention was found in the literature dealing with this species that the revisers had examined Schlotheim's material, and it is not known whether his "types" are extant.

King (1850: 28), in first assigning *Coralliolites columnaris* to *Stenopora*, and Geinitz (1861: 113), in extending the application of this species, appear to have included a good many forms that do not belong in the same species and some that probably do not belong in the same genus. Geinitz (1861: 114–115) further complicated matters by distinguishing several "varieties" of *Stenopora columnaris*. Examples of these "varieties" were furnished to Waagen and Wentzel (1886: 880–883), who identified some of the same forms among the specimens they described as *Geinitzella columnaris* from the Permian of the Salt Range. Waagen and Wentzel (1886: 880) stated that their genus *Geinitzella* was "founded" on *Stenopora columnaris* but did not specifically designate this species as genotype. Although most subsequent workers have considered this species to be the type, no one seems to have unequivocally designated it as such until 1935 (Bassler, 1935: 117). In the meantime, Lee (1912: 152) had selected "*Geinitzella ramosa* [sic] var. *inerustans*" as the genolectotype. The trivial name "*ramosa*" is obviously a *lapsus*, inasmuch as Lee referred to the description and figures of *Geinitzella columnaris* var. *inerustans* and name "*ramosa*" applies to another variety distinguished by Geinitz. The nomenclatural status of varieties has been a matter of dispute,

some specialists contending that a variety is not equivalent to a subspecies, the lowest nomenclatural category recognized in the present Code, and therefore is to be ignored for purposes of nomenclature. The revised Code presumably will clarify this situation by providing for the nomenclatural recognition of varieties described before 1950. Lee's selection therefore, as Crockford (1947: 34) has remarked, "must be accepted," and the genus *Geinitzella* must be interpreted on the genolectotype *Stenopora columnaris* var. *incrustans* Geinitz (1861: 114) = *Geinitzella incrustans* (Geinitz).

Even though *Geinitzella incrustans* is accorded recognition as the genolectotype, the taxonomic significance of the genus has yet to be determined. Previous interpretations of the structural characters of this species (Lee, 1912: 152; Bassler, 1929: 61; 1935: 117; Crockford, 1947: 34) seem to have been based entirely on Waagen and Wentzel's figures (Waagen and Wentzel, 1886: pl. 106, figs. 5, 6) of specimens from the Salt Range and not on Geinitz's types. Waagen and Wentzel's description and figures are inadequate for determination of generic characters, especially because no tangential section was figured and it is not possible to tell whether the tubular structures between the zooecia, shown in the longitudinal sections, are mesopores or acanthopores. Bassler (1929: 61; 1935: 117) apparently interpreted these small tubes as mesopores, inasmuch as he stated (1929) that the specimens "may represent the group for which *Dyscritella* is now employed" and (1935) that this species "seems to be the incrusting portion of a *Batostomella* without diaphragms." Crockford (1947: 34) observed that these figures show irregularly thickened zooecial walls and concluded that Waagen and Wentzel's *Geinitzella columnaris* var. *incrustans* should probably be referred to *Stenopora*. My impression is that the figures show part of a ramose stenoporoid "incrusted" with a layer of renewed growth of the same species. The feature of renewed growth in one or more layers is rather common among the stony bryozoans, including ramose and bifoliate species as well as those having massive and laminar zooaria, and certainly is not of sufficient zoological significance to differentiate a "variety" (in the sense of subspecies).

In any event, the genus should be interpreted not on specimens from the Salt Range but on Geinitz's types of *Stenopora columnaris* var. *incrustans* from the Zechstein of Germany. Unfortunately Geinitz's type specimens apparently have not been subjected to study by modern methods, and the original descriptions and figures (Geinitz, 1861: 114, pl. 21, figs. 1–6, 8, 19) are not adequate for interpretation. It is probable that more than one species is represented among the figured specimens. Dybowski's investigation (Dybowski, 1876, 1877) of the species was based on specimens in the collections of the University of Dorpat that he had identified with Geinitz's figures (Geinitz, 1861: pl. 21, fig. 19, 19A) of a specimen deposited in the Dresden Museum. Dybowski's figured specimen may be identical with Geinitz's species, but this cannot be verified by examination of the illustrations. It seems advisable, however, to here designate the specimen figured by Geinitz on plate 21, figure 19, as the lectotype of *Geinitzella incrustans* (Geinitz).

Assuming that Dybowski's material is identical with the lectotype, it is difficult to decide whether the species should be referred to *Stenopora* or recognized as belonging to a distinct genus—*Geinitzella*. Dybowski's figures appear to depict an incrusting stenoporoid with relatively abundant mesopores. *Stenopora* is commonly described as having few mesopores. It is impossible to tell whether the lectotype here chosen has mesopores, hence the uncertainty as to whether Dybowski correctly identified his specimens. Species of *Stenopora* differ considerably in the development of mesopores. In specimens of the genotype, *S. tasmaniensis* Lonsdale (1844: 161–162; see also Bassler, 1941: 173–174, figs. 5, 6), mesopores are absent or extremely rare. On the other hand, a good many of the species of *Stenopora* described and illustrated by Crockford (1943, 1945) in recent years are characterized by a moderate number of mesopores, especially in the monticules. As none of these species are incrusting or laminar forms, Crockford's studies furnish no data on the comparative development of mesopores in zooaria of this type. Among the incrusting stenoporoids described from the late Paleozoic of North America are two species that seem to be correctly identified as *Stenopora*. *S. spinulosa* Rogers (1900: 1–2) is described as having a few small mesopores, whereas *S. granulosa* Girty (1908: 128–129) is characterized by a moderate number of mesopores. Condra (1903: 41) reported that the walls of *S. spinulosa* are not moniliform. Girty's species from the Permian of the Guadalupe Mountains has definite though

few monilae in the zooecial walls (Girty, 1908: pl. 19, fig. 1c). In general, beading appears to be very much more distinct in the thinner-walled stenoporoids, and it is to be expected that thick-walled species, such as *S. spinulosa*, will not exhibit conspicuous monilae.

In light of the foregoing observations, Dybowski's figured specimens of *Stenopora columnaris* [var. *inerustans*] from the Lower Zechstein near Gera belong with the taxonomic unit now called *Stenopora*. Until the lectotype of Geinitz's species can be demonstrated to possess a different combination of characters, the name *Geinitzella* should be referred to the synonymy of *Stenopora*. Future work, of course, may show *Geinitzella* to be applicable for a subgenus of incrusting and laminar Stenoporas. At present, however, differentiation based on these zooarial habits does not seem to be advisable. As long ago as 1891, Etheridge (p. 48) expressed the opinion that the distinction between *Geinitzella* and *Stenopora* seemed to be a very artificial one. His observation is certainly supported by the published illustrations and later studies.

The suggestion (Bassler, 1929: 61) that *Geinitzella* may be a senior synonym of *Dyseritella* merits no serious consideration, for there is not the slightest indication that in the type species of *Geinitzella* mesopores even approach the abundance characteristic of the leioclemoid genus *Dyseritella*. The specimens illustrated by Waagen and Wentzel (1886: 883, pl. 113, figs. 3, 4) as "*Geinitzella columnaris* var. *ramosa multigemmata*" may indeed prove to be a species of *Dyseritella;* but for the present at least, the other specimens Waagen and Wentzel figured as *Geinitzella crassa* (which most certainly is not specifically identical with *Stenopora crassa* Lonsdale, 1845: 632) and varieties of *G. inerustans* may conveniently be assigned to *Stenopora*.

Other species, mostly from Russia and Asia, that have been assigned to *Geinitzella* probably will be found to belong to *Stenopora*, *Stenodiscus*, *Rhombotrypella* Nikiforova (1933a: 36), or other stenoporoid genera. *Geinitzella chinensis*, described by Girty (1907: 42; 1913: 315, pl. 28, figs. 9–14) from the Permian of China, is a *Stenodiscus* with mesoporelike acanthopores. Likewise, the three species, *Batostomella* (*Geinitzella*) *hayasakai*, *B.* (*Geinitzella*) *yunnanensis*, and *B.* (*Geinitzella*) *manchuriensis*, recently described by Yabe and Sugiyama (1942: 406–414) from the lower Permian of China are probably *Stenodiscus*. The wall structure of these species is not discussed and the figures are very inadequate, but indications are that this is the most logical generic assignment.

Status of Batostomellina.—This name, introduced by Vinassa de Regny (1921: 227) for a subgenus of *Batostomella*, has never gained acceptance. Bassler (1935: 54, 55) considered it to be a junior synonym of *Batostomella*, for the genotype, *Trematopora granulifera* Hall (1852: 154, pl. 40A, figs. 9a–e), had been referred to *Batostomella* by Nickles and Bassler (1900: 180) and later was redescribed and refigured by Bassler (1906a: 28–29, pl. 13, figs. 1–5, pl. 24, figs. 10, 11, pl. 25, figs. 11, 12).

In connection with the present investigation, thin sections were prepared of Hall's types of *Trematopora granulifera*. From among the cotypes included in American Museum of Natural History Cat. No. 1757, the specimen figured by Hall (1852: pl. 40A, fig. 9e) and refigured by Bassler (1906a: pl. 24, fig. 10) is here selected as lectotype of the species. Thin sections show the type to be identical with the topotypes (U. S. Nat. Mus. no. 35517) figured by Bassler (1906a: pl. 13, figs. 1–5).

A study of the excellent sections prepared by Bassler shows that the general features of *Trematopora granulifera* are accurately described and figured. However, examination at higher magnifications than those used for Bassler's illustrations has revealed some features not hitherto described. First, the wall structure of this species is not comparable to that of the later Paleozoic "Batostomellidae." The zooecial walls are rather vague and not distinctly laminated and appear to be more like those of *Trematopora tuberculata* Hall (1852: 149), the genotype of *Trematopora* Hall (1852: 149). The possibility was considered that this similarity was deceiving and due to conditions of preservation, inasmuch as both *T. tuberculata* and *T. granulifera* occur in the Rochester shale at Lockport, N. Y.; but other species from the same locality and horizon do not support that interpretation. Both *Trematopora tuberculata* and *T. granulifera* have very narrow mature zones, lack diaphragms in the zooecia, and possess abundant mesopores, which are closed at the surface. In *T. tuberculata* the mesopores are beaded, whereas in *T. granulifera* they are so obscured by acanthopores that it is impossible to be sure whether diaphragms are completely absent.

The most distinctive features of *T. granulifera*, however, are to be noted in the acanthopores. These structures are extremely abundant and near the surface completely obscure the mesopores. In comparison with the zooecia, the acanthopore tubes are relatively large, closed at the surface but hollow through most of their length and lined with minute mural spines. These tiny spines give a ragged hazy appearance to the walls in the mature region. Bassler's figures (Bassler, 1906a: pl. 13, figs. 4, 5) give some impression of this condition, but the cause was apparently not observed or described.

As a result of the present study, *Batostomellina* Vinassa de Regny should be restored as a generic name for lower Paleozoic trepostomatous bryozoans. The genotype appears to be allied to *Trematopora*; and, for the time being, the genus may be assigned to the Trematoporidae, a family that no doubt needs revision along with the other trepostomatous families established more than half a century ago.

The three other species assigned to *Batostomellina* by Vinassa de Regny (1921: 227) most certainly are not related to *B. granulifera* (Hall). *Dyscritella ambigua* Lee (1912: 181, pl. 16, figs. 11, 12) may be correctly assigned to *Dyscritella*—in any event it appears to be a leioclemoid or a stenoporoid bryozoan. *Bythopora parvula* (James, 1878: 3; see also Bassler, 1906: 22, pl. 3, figs. 11, 12, pl. 5, fig. 4) appears to be a *Bythopora* though it possesses some cryptostomatous features. *Batostomella interporosa* Ulrich and Bassler (1913: 270–271, pl. 45, figs. 1, 2, pl. 48, fig. 5) resembles the type of *Dyscritella* in many respects, and for the time being may be considered a delicate species of that genus.

Aside from the genotype, the writer does not know of any described species that should be assigned to *Batostomellina*. It is not expected that the name will be applicable for any species of "batostomellid" bryozoans from the late Paleozoic.

Systematic position of "Batostomella" spinulosa.—Much of the difficulty experienced by previous workers in dealing with the genus "*Batostomella*" and the group of genera included in the family "Batostomellidae" is directly attributable to Ulrich's faulty interpretation of *B. spinulosa*. In the collections of the U. S. National Museum are two slides of the figured sections (Ulrich, 1890a: pl. 75, figs. 1d, e, f), one bearing the tangential and longitudinal sections illustrated in figures 1d and 1e and the other the longitudinal section shown in figure 1f. Sections 1d and 1e were made presumably from the same specimen, but there is no way of knowing whether section 1f came from the same fragment. In section 1f, diaphragms are lacking in the zooecial tubes. Unfortunately there is no tangential section to compare with the tangential on the other slide. The sections figured as 1d and 1e were partly shattered in mounting, and the longitudinal especially is too thick for microscope examination. Rather abundant diaphragms are shown in Ulrich's figure 1e. In the immature region, at least, calcite cleavage cracks were misinterpreted as diaphragms. A few diaphragms are present in the transition zone and mature region of some zooecia, but most of the diaphragms illustrated in this figure are cracks or strands of dense zooecial deposits. The diaphragms shown in some mesopores on the left side of figure 1e cannot be identified in the section. In the description of this species Ulrich (1890a: 434–435) reports the mesopores to be moderately abundant. Actually they are relatively few, very inconspicuous, and mostly no larger than the acanthopores.

As Ulrich's figured sections of this species are inadequate for study and interpretation of its characters, and as a type for this species has never been named, a lectotype (U.S.N.M. no. 114344) has been chosen from the specimens labeled by Ulrich as his cotypes. This specimen has been sectioned and without doubt is identical with the species figured by Ulrich (1890a: pl. 75, figs. 1d, 1e).

The newly made thin sections of the lectotype amply confirm the preceding statements about the occurrence of diaphragms. None are present in the mesopores or in the immature region. A very few zooecia have a single diaphragm in the transition zone. A longitudinal section through an older part of the zooarium shows that approximately half the zooecia contain one or two, occasionally three, diaphragms in the mature region. A longitudinal section through a younger part of the zooarium exhibits very few diaphragms; in fact they are absent in most of the zooecia. It seems possible that diaphragms may have been developed in the ephebic growth stages, an explanation that would account for their variable distribution in different parts of the zooarium. The longitudinal section lacking diaphragms that was figured by Ulrich (1890a: pl. 75, fig. 1f) may well have cut the growing end of a branch.

A tendency toward intermittent thickening of the zooecial walls in the transition zone and early mature region is to be observed, especially in the older part of the zooarium. Other specific characters were adequately described and figured by Ulrich and need not be repeated here.

Many of the Carboniferous species that have been assigned to "*Batostomella*" and that seem to be rather closely allied to "*B.*" *spinulosa* possess features, such as intermittently thickened or moniliform walls and perforated diaphragms, that are commonly held to be stenoporoid. Some of these species perhaps should be more correctly assigned to *Stenopora* Lonsdale, *Tabulipora* Young (1883: 154; see also Lee, 1912: 149), *Stenodiscus* Crockford, and allied genera. At the present state of our knowledge, it would be difficult to formulate a definition for a genus that would encompass the late Paleozoic species generally referred to "*Batostomella*" without transgressing limits set for several other genera. The erection of a new genus for the group of species more or less typified by "*B.*" *spinulosa* does not seem wise at this time. In the event a new genus is defined, it would be well to avoid naming "*B.*" *spinulosa* or any of the other species described by Ulrich in 1890 as genotype, because we have only vague locality data for these species, and their geologic horizons are somewhat indefinite. It has not been possible to examine and evaluate all the species described from North America, the number of which is insignificant in comparison with the known but undescribed species and the abundant material still unstudied, which is expected to increase our information on this group manifold. Until comprehensive studies can be made of skeletal structures, variation, and evolutionary trends in the stenoporoids, rhomboporoids, and "bastostomellids," the introduction of a single new generic name for this poorly understood group will serve no useful purpose. For the present it will suffice to retain most of the described species in "*Batostomella*."

Revised classification of the "batostomellid" Bryozoa.—Whether the name *Batostomella* is recognized for an early Paleozoic genus of probable heterotrypid affinity or held to be a synonym of *Bythopora*, the family name Batostomellidae proposed by Ulrich (1890a: 341, 375; see also Miller, 1889: 290) is no longer tenable for those genera commonly described as stenoporoid or leioclemoid. Some might argue that the family name should become accordingly Bythoporidae; but *Bythopora* Miller and Dyer, *Eridotrypa* Ulrich (1893: 264), and some other genera, based on genotypes of Ordovician age and known exclusively from the lower Paleozoic, are not in the least typical of the large group of genera now included in the family, nearly all of which are confined to later rocks. Both *Bythopora* and *Eridotrypa*, which are similar in many ways, appear to be closely allied to the Heterotrypidae, though revision may show the need for recognizing a separate family for these two and some other related lower Paleozoic genera.

The problem of basic relationships was confused originally by Ulrich's inclusion of two very different types of bryozoans in his genus *Batostomella*, the type of the family. One of his "types," "*B.*" *spinulosa*, was obviously related to species grading into the stenoporoids and rhomboporoids, whereas the actual type, *B. gracilis* (Nicholson), superficially resembles some species of *Bythopora*. For this reason, no doubt, *Bythopora* was originally placed in the family along with *Batostomella*, *Stenopora*, *Anisotrypa* Ulrich (1883: 275–276), *Callotrypa* Hall and Simpson (1887: xvi), and *Leioclema* Ulrich (1882: 141). After Ulrich (1893: 228) referred *Batostomella gracilis* to *Homotrypella*, a monticuliporoid bryozoan, and *B. simulatrix* Ulrich (1890a: 432–433), another Ordovician species, to *Eridotrypa* (see Ulrich, 1893: 265), the premises for assuming there was a systematic gradation from the early to the late Paleozoic "batostomellid" genera were nullified. Even Ulrich (1893: 265) recognized this when he wrote of *Eridotrypa*, "The systematic position of the genus, though in a measure doubtful, is probably intermediate between *Homotrypa* (compare *H. similis* Foord) of the Monticuliporidae, and *Bythopora* Miller and Dyer, of the Batostomellidae. Because of the absence of cystiphragms it will be best to embrace the genus provisionally in the latter family."

Though Ulrich realized originally that he had included an "incongruous assemblage" of genera in his family Batostomellidae and indicated a few years later that his ideas about relationships and phylogeny had changed considerably, he apparently felt that published knowledge was too scant to substantiate a radical redistribution of genera and revision of the family classification. In any event, *Bythopora* and *Eridotrypa* were left in the family Batostomellidae, as it was then understood, and have been retained there until the present in spite of our greatly increased knowl-

edge of the later Paleozoic Trepostomata and their relationships.

Of the other genera Ulrich included in the family, *Stenopora*, *Anisotrypa*, and *Leioclema*, though representing rather diverse structural types, appear to be related through a series of transitional genera, and consequently their inclusion in the same supergeneric division can be reconciled. The systematic relationships of *Callotrypa* are uncertain, because its genotype has never been critically studied. Likewise, *Trematella* Hall (1886: expl. pl. 25), which Ulrich (1893: 264) considered to be a synonym of *Batostomella*, has never been adequately studied and its taxonomic position is undetermined.

Since 1893 a large number of genera based mostly on Devonian and post-Devonian species have been assigned to the family "Batostomellidae." Two Ordovician genera, *Esthoniopora* Bassler (1911: 259) and *Orbipora* Eichwald (1856: 92), have been called primitive stenoporoids, but they differ so obviously from the typical late Paleozoic forms that they may well belong elsewhere in the classification. *Koninckopora* Lee (1912: 152) has for a genotype a species that has been demonstrated (Wood, 1943: 205–221) to be an alga and is therefore eliminated. Left in the family are more than a score of genera that seem to be closely related to divisions we may conveniently designate the *Stenopora* and *Leioclema* groups. As a few genera are transitional between the two main structural divisions, the establishment of two families is not feasible. Inasmuch as the name Batostomellidae is inapplicable, a new name is needed. The family Stenoporidae is here proposed, not as an exact substitute for the family Batostomellidae as it commonly has been applied, but as a taxonomic division that will include the *Stenopora* and *Leioclema* types of trepostomatous bryozoans.

A point of priority is involved in proposing the name Stenoporidae for a bryozoan family. Waagen and Wentzel (1886: 873, 875) originally introduced the subfamily Stenoporinae as a division of the Monticuliporidae (a name early students used generally for the stony bryozoans) several years prior to Ulrich's publication of the family name Batostomellidae. Ulrich apparently was unaware of Waagen and Wentzel's work when he prepared the manuscript for the Geological Survey of Illinois Volume VIII. Etheridge (1891: 31) adopted the subfamily Stenoporinae as a convenient taxonomic division, but it seems to have been ignored by paleontologists ever since even though many genera are commonly referred to as stenoporoids. The name *Stenopora* has been widely used for many stenoporoid species, especially in earlier work before the generic distinctions now recognized were observed. Though now restricted, the genus is one of the best established and most characteristic of the group, and it is most appropriately chosen as type of the family.

Stenoporidae, n. fam.

Definition.—Trepostomatous Bryozoa characterized by distinctly laminated, generally amalgamate zooecial walls. Zooaria of variable habit—ramose, massive, incrusting, frondescent, and bifoliate.

Stenoporoid genera distinguished typically by irregularly thickened walls in the mature region, the thickening being intermittent in primitive types and trending to conspicuous beading in advanced forms. Mesopores not abundant in most genera. Acanthopores commonly very abundant and conspicuous. Diaphragms generally complete in primitive forms; commonly perforated, incomplete, or lacking in more advanced genera.

Leioclemoid genera characterized typically by rather uniformly thickened and comparatively thin zooecial walls in the mature region. Mesopores abundant, generally completely isolating the zooecia. Acanthopores generally abundant but, owing to the excessive number of mesopores, usually less conspicuous than in the stenoporoids. Diaphragms variable in occurrence and type; complete or absent in the mesopores; typically complete in the zooecia, but perforated or lacking in some genera and species.

Remarks.—A few genera, which appear to be transitional or highly specialized forms, possess some characters that are diagnostic of the stenoporoids and others that are distinctly leioclemoid. For example, certain species that have been assigned to *Leioclema* and allied genera have intermittently thickened or beaded walls and others have perforated diaphragms. On the other hand, several predominantly stenoporoid genera possess mesopores in an abundance comparable to that of the leioclemoids.

A few of the genera in the following list are included in the family Stenoporidae with considerable doubt. Typical *Anisotrypa* (some of the species assigned to this genus probably are more

properly referable to *Tabulipora*), *Callocladia*, *Coeloclemis*, and *Syringoclemis* all have some cryptostomatous features.

As outlined in the preceding discussion, *Baloslomella*, *Bylhopora*, *Eridotrypa*, *Esthoniopora*, and *Orbipora* appear to have no close relationships with the Stenoporidae. *Koninckopora* is not a bryozoan. *Callolrypa* and *Tremalella* are at present too poorly known to be used taxonomically, and their genotypes will have to be studied before family assignments can be made. *Lioclemella* possesses none of the diagnostic characters of the Stenoporidae, and its systematic position is uncertain.

Of the genera listed, only *Leioclema* is at present accommodating Ordovician and Silurian species. A study of the thin sections of most of the lower Paleozoic species that have been assigned to *Leioclema* casts much doubt on the appropriateness of referring most, if not all, of these species to the genus. It is difficult to reconcile the wall structure and various other features exhibited by these earlier Paleozoic forms with the morphology of the Lower Carboniferous genotype *Leioclema punclalum* (Hall, 1858: 653). One can only conclude that the Ordovician and Silurian species are examples of homeomorphy and were derived from several different stocks. Some of these species appear to have relationships with *Nicholsonella* Ulrich in Miller (1889: 313), others with *Hallopora* Bassler (1911: 325), and still others with such monticuliporoids as *Homolrypella* Ulrich (1886a: 83) and *Alacloporella* Ulrich (1883: 247). Careful study of the lower Paleozoic species now included in *Leioclema* will probably demonstrate the need for establishing several genera in order to avoid a polyphyletic genus.

Range.—Silurian?, Devonian-Permian.

Genera of lhe Slenoporidae.—

Amphiporella Girty, 1910.
Anisotrypa Ulrich, 1883.
"*Batostomella*" Ulrich, 1890 (non *Batostomella* Ulrich, 1882).
Calacanthopora Duncan, 1939.
Callocladia Girty, 1910.
Chondraulus Duncan, 1939.
Coeloclemis Girty, 1910.
Diplostenopora Ulrich and Bassler, 1913.
Dyoidophragma Duncan, 1939.
Dyscritella Girty, 1910.
Eostenopora Duncan, 1939.
Leeporina Vinassa de Regny, 1921.
Leioclema Ulrich, 1882 (objective synonym: *Lioclema* Ulrich, 1896; subjective synonym?: *Thallostigma* Hall, 1883).
Liopora Girty, 1915.
Megacanthopora Moore, 1929.
Microcampylus Duncan, 1939.
Pycnopora Girty, 1910.
Rhombotrypella Nikiforova, 1933.
Stenocladia Girty, 1910.
Stenodiscus Crockford, 1945.
Stenophragma Munro, 1912.
Stenopora Lonsdale, 1844 (subjective synonyms: ?*Tubuliclidia* Lonsdale, 1845[2]; ?*Geinitzella* Waagen and Wentzel, 1886; *Ulrichotrypa* Bassler, 1929).
Stenoporella Bassler, 1936.
Stereotoechus Duncan, 1939.
Syringoclemis Girty, 1910.
Tabulipora Young, 1883.
Tabuliporella Nikiforova, 1933.
Trachytoechus Duncan, 1939.

DICHOTRYPA ULRICH IN MILLER, 1889

Although Ulrich (1890a: 386) designated *D. foliala* Ulrich (1890a: 499) as type of the genus, the prior publication of a generic diagnosis in Miller (1889: 300) with a list of the species Ulrich intended to include in the genus, all but one of which were *nomina nuda*, makes that designation invalid. *Fislulipora flabellum* Rominger (1866: 122) was the only included species for which a description had been published in 1889. Therefore, under Article 30 *Dichotrypa* is a monotypical genus taking *D. flabella* (Rominger) as its type. So far as can be determined, the recognition of this species as genotype does not create a zoologic problem, and the generic concept is essentially unchanged.

[2] The name *Tubuliclidia* was originally published (Murchison and Verneuil, 1844: 497–498) in connection with two undescribed species listed in a faunal chart. It was therefore a *nomen nudum* and had no status (under the present Code and Opinion 53) until the following year, when Lonsdale (1845: 631) noted that he preferred to use the name *Stenopora* for the genus. *Tubuliclidia* has been cited in some synonymies of *Stenopora*, and it seems to have been assumed that *S. tasmaniensis* Lonsdale (see Bassler, 1935: 222) was the genotype. This species, however, was not one of the two originally assigned to *Tubuliclidia*, and moreover it came from a different continent. According to current interpretation of the Code, *S. tasmaniensis* is inadmissible as type. Unfortunately neither *Stenopora spinigera* Lonsdale (1845: 632) nor *S. crassa* Lonsdale (1845: 632), which were originally included in *Tubuliclidia*, have been carefully studied, and the possibility exists that these two species do not belong to *Stenopora*. Inasmuch as the original figures and description of *Stenopora crassa* = *Tubuliclidia crassa* indicate good possibility of its being a *Stenopora*, this species is here designated type of the genus *Tubuliclidia* in the hope that the name can be demonstrated eventually to be a subjective synonym if the revised Code does not provide for rejecting it as a junior objective synonym.

LYROPORA HALL, 1857

Hall (1857: 179) originally distinguished *Lyropora* as a subgenus of *Fenestella* and described three species but did not designate a genotype. Subsequent authors (Ulrich, 1882: 150; Claypole, 1883: 32; Hall, 1885: 37; Waagen and Pichl, 1885: 773; Ulrich, 1886: 5) who recognized and discussed this genus failed to select a genotype. Therefore Miller's designation (1889: 312) of *Lyropora lyra* Hall (1857: 179) as type of the genus must stand. Ulrich (1890a: 583) considered *L. lyra* to be a slightly modified form of *L. subquadrans* Hall (1857: 180) differing so little from that species that it could not even be distinguished as a variety. Nickles and Bassler (1900: 311) list the *L. lyra* form as *Lyropora subquadrans-lyra* (Hall). Bassler (1935: 142) cites *Fenestella* (*Lyropora*) *subquadrans* Hall, 1857, as type of the genus. Whether referring *L. lyra* to synonymy with *L. subquadrans* is a legitimate procedure can be determined only from a study of the type specimens, which apparently were not examined by Ulrich or later workers. In any event, the type citation should be *Fenestella* (*Lyropora*) *lyra* Hall, a species which may be identical with *Fenestella* (*Lyropora*) *subquadrans* Hall. Under the circumstances, it would seem more appropriate to consider *L. subquadrans* a possible synonym of *L. lyra*.

MEEKOPORA ULRICH IN MILLER, 1889

Ulrich's designation (1890a: 383) of *Meekopora eximia* Ulrich (1890a: 483–484) as type of this genus is invalid owing to the fact that Miller (1889: 312–313) originally published the generic diagnosis in connection with a single previously described species, *Fistulipora? clausa* Ulrich (1884: 47). *Meekopora* is therefore a monotypical genus having *M. clausa* (Ulrich) as its type species. Inasmuch as *M. clausa* is a well-known and very typical species of *Meekopora*, no change in generic concept is required.

NEMATOPORA ULRICH, 1888

This genus was first proposed by Ulrich in 1888 (231, 234) although it was recorded as new in 1890 (Ulrich, 1890a: 401) with *N. quadrata* Ulrich (1890a: 644–645) designated as type. Miller (1889: 313) followed Ulrich (in press), giving a generic diagnosis with *N. quadrata* as type of the genus and listing three other species, all being *nomina nuda* in 1889. Neither Miller in 1889 nor Ulrich in 1890 makes any reference to the publication in which Ulrich (1888: 231, 232, 234) first proposed the generic name, gave the characters distinguishing the genus from others included in the family Arthrostylidae, and definitely assigned to *Nematopora* two previously described species, *Helopora lineata* Billings (1866: 36–37) and *Trematopora minuta* Hall = *Trematopora? (Trachypora?) minuta* Hall (1876: pl. 11, fig. 8). Although Ulrich (1888: 231) stated, "This genus together with a number of species will be described in vol. viii, Illinois geological survey, now in press," he obviously published the name in 1888 with sufficient information to distinguish the genus from related forms. As Ulrich's intended type was not named or differentiated from other species in 1888, one of the two valid species originally assigned to the genus must be chosen genolectotype. Therefore *Nematopora minuta* (Hall) is here selected type of the genus, supplanting *N. quadrata* Ulrich, which was later (Ulrich, 1893: 204–205) held to be identical with *N. ovalis* Ulrich (1890: 197), the description of which had been published a few months earlier.

As far as is known, *Nematopora minuta* (Hall) is congeneric with *N. ovalis* = *N. quadrata* Ulrich, and the designation of Hall's species as type of the genus probably will not require any revision of the present generic diagnosis.

PTYLOPORA McCOY, 1844

The genotype, *Ptylopora pluma* McCoy (1844: 200), is apparently cited correctly by Nickles and Bassler (1900: 382) and Bassler (1935: 179), though this fact could not be ascertained from a review of the references listed in these synonymies. McCoy described two species at the time he defined the genus but failed to designate a genotype. An investigation of the articles cited in Nickles and Bassler revealed that the monograph by Hall and Simpson (1887: xxiv) was the first reference that named a genotype—*Retepora flustriformis* Phillips, one of the two available species. Miller cited the same species in 1889 (319), and Ulrich (1890a: 398) gave "(?) Type: *Retepora flustriformis* Phillips." The question therefore arose as to why *Ptylopora pluma* was cited as type of the genus in later publications, and the literature published prior to 1887 was searched in order to find an explanation for the discrepancy.

As the two standard synonymies do not list the publication in which *P. pluma* was first named the type of the genus, students should add this

essential reference. Vine in 1884 (189, 191) cited *P. pluma* McCoy, the other of the two available species, as the "accepted type" and "type" of "*Ptilopora.*" So far as the writer has been able to find, Vine's paper of 1884 was the first to definitely name a type species for *Ptylopora*, and this article antedates by several years the American publications noted above in which *P. flustriformis* was cited as type. This circumstance is fortunate inasmuch as Shrubsole (1879: 278–279; 1881: 181), after a careful review of the species of British Carboniferous Fenestellidae, concluded that *Fenestella flustriformis* = *Retepora flustriformis* Phillips (1836: 198–199) was based on the "cast only of the reverse face" of *Fenestella plebeia* McCoy (1844: 203). If *Retepora flustriformis* Phillips had been a valid selection, *Ptylopora* would have to be referred to the synonymy of *Fenestella* Lonsdale (1839: 677–678), a preoccupied name for which suspension of the Rules has been requested (Science, n. s., **106** (2763): 585).

STREBLOTRYPA VINE EX ULRICH, 1885

Vine (1885: 391) first published the name *Streblotrypa* in connection with Ulrich's manuscript species *S. "nicklisi,"* specimens of which had been sent to him by J. M. Nickles. Vine also identified a fragment from the Carboniferous of Yorkshire with Nickles's material from the Chester group of Kaskaskia, Ill. Although Vine did not give a generic diagnosis, he did compare and figure the British and American specimens and described some of the characters, thereby validating the name. Bibliographies and synonymies (Nickles and Bassler, 1900: 420; Bassler, 1935: 210) credit the name *Streblotrypa* to Ulrich, 1890. There can be no doubt, however, that Vine was responsible for the original publication in 1885, and in an article published the following year (Vine, 1886: 96–97) he noted additional occurrences of *S. nicklesi* [erroneously spelled "*nicklisi*"], described a new species of the genus, and made some comments intended to justify his publication of Ulrich's manuscript name for which he had been criticized. Ulrich himself in 1888 (Ulrich, 1888a: 84–89) published descriptions of eight species of *Streblotrypa*, but not of *S. nicklesi*. If Vine had not previously published a description of the species that Ulrich intended should be the type of the genus, one of Ulrich's species of 1888 or *Ceriopora? hamiltonensis* Nicholson (1874: 161), which was referred to *Streblotrypa* in the same publication, would be the genosyntypes. A diagnosis of the genus was published by Miller (1889: 325), who took his data from Ulrich's 1890 monograph, then in press.

Fortunately Vine's concept of the genus and species was based mainly on material furnished to him by Nickles from the Chester group of Kaskaskia, Ill. Vine had only one fragment from Yorkshire, and this was subsequently reported lost (Vine, 1890: 191). In order to stabilize the nomenclature of *Streblotrypa nicklesi* Vine ex Ulrich, 1885, and exclude from further consideration the "lost" specimen from Yorkshire, which probably was not identical with the American specimens, this occasion is taken to designate the American specimens as types of the species. The present location of Vine's type specimens is unknown, but the suite of topotypes that Nickles submitted to Ulrich is catalogued under U.S.N.M. no. 43311 (Merrill, 1905: 630).

TAENIODICTYA ULRICH, 1888

Ulrich first published this name in connection with his description of *Taeniodictya interpolata* Ulrich (1888a: 80) from the Cuyahoga "shales" of Ohio. The generic name therefore dates from 1888 and not from 1889, when the generic diagnosis was first published by Miller (1889: 327), or 1890, when Ulrich's monograph was published (Ulrich, 1890a: 393). As only one species was described when Ulrich originally published the name, the genus is monotypical, with *T. interpolata* taken as the type under Article 30-Ic. When Miller published the first diagnosis in 1889, he followed Ulrich in designating *T. ramulosa* Ulrich (1890a: 528–529) as type of the genus and listed four other species and one variety. All the specific names except that of *T. interpolata* were *nomina nuda*, so the genus was still monotypical at that date.

In some respects *Taeniodictya interpolata* differs from what Ulrich called "typical species" of the genus (Ulrich, 1888a: 80). Future investigators therefore may find it necessary to revise the generic concept.

TREMATELLA HALL, 1886

The genotype commonly cited for *Trematella*, i.e., *Trematopora? annulata* Hall (1883: 147), is not admissible under Article 30 as interpreted in Opinion 7. Hall (1886: expl. pl. 25, figs. 4, 5) used the expression "nov. sub. gen. et sp." in connection with the species *Trematella glomerata.*

As neither of the two other species—*Trematopora arborea* Hall (1883: 147) and *Trematopora? annulata*—referred to *Trematella* in this publication were specifically named type of the genus, *Trematella glomerata* is to be recognized as the type by original designation. The selection of *Trematella annulata* by Hall and Simpson (1887: xiv) is consequently inacceptable.

WORTHENOPORA ULRICH IN MILLER, 1889

Owing to Miller's publication (1889: 330) of Ulrich's diagnosis with mention of the two species Ulrich intended to include in the genus, *Flustra spatulata* Prout (1859: 446) will have to be recognized as genotype. The other species, *Worthenopora spinosa* Ulrich (1890a: 669–670), which was cited as type, was undescribed and therefore unavailable.

So far as is known, recognition of *Worthenopora spatulata* (Prout) as type of the genus will not result in any change in morphologic concept.

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